

REMARKS

The amendments to claims 1 and 28 delete the ambiguous preamble to address the rejection under 35 USC §112, second paragraph. These claims have also been amended to insert the connective “and” where appropriate to clarify the subject matter claimed. These amendments do not change the scope of claims 1 and 28.

Claims 1-34, 36-39 and 41-48 have been identified as allowable over the prior art.

Claim 71

New Claim 71 defines a core-shell impact modifier wherein the “core is produced by simultaneously introducing the polyfunctional crosslinking agent and the diallyl maleate into the reaction mixture and the production of the covering is carried out at a temperature greater than that used for the preparation of the nucleus.” Support for these embodiments is found on page 13, lines 12-13 and 16-21 of the specification. This technique provides a core with a distinct composition at the periphery (the cover) of the core, i.e. copolymer II, than the composition at the center (the nucleus) of the core, i.e., copolymer I, without a separate step to add additional monomers.

The composition of Claim 71 contains core-shell impact modifiers wherein the core has a periphery with a distinct composition than the center of the core. Core-shell impact modifiers with such a configuration for the core are not shown or suggested by the cited references.

Claims 49-68

Claims 49 -68 define core-shell impact modifiers with a core comprised of a combination of diallyl maleate and an alkyl acrylate wherein the alkyl group has a minimum of five carbons and a maximum of twelve carbon atoms. The cited references do not show or suggest this combination of components in forming the core.

Brown (U.S. 4,788,251) discloses the use of C₁-C₅ acrylates and methacrylates in the cores of core shell impact modifiers at column 6, lines 43-47. The preferred polymers are said to comprise butyl acrylate at column 7, lines 26-27.

Wu et al. (U.S. 5,346,954) also discloses that butyl acrylate is the preferred alkyl acrylate at col. 4, lines 21-22, in forming polymer particles which can be covered in a shell. Wu et al. discloses the use of butyl acrylate in the examples. The generic disclosure at

column 4, lines 16-21, indicates an alkyl acrylate having an alkyl group of from C₂-C₈ is used.

Dunkle et al. (U.S. 4,659,767) provides a similar generic disclosure to that of Wu et al. '954 at column 2, lines 60-63 and teaches that the core, "usually will contain butyl acrylate units," at column 3, lines 41-42.

While the broad generic disclosures within these references mention the use of diallyl maleate and alkyl acrylates other than butyl acrylate, there is no direction to select diallyl maleate for combination with 100 % C₅-C₁₂ alkyl acrylates as the acrylate monomer component in forming a core consistent with this invention. These references would lead one skilled in the art to select at least a portion of alkyl acrylates with smaller alkyl groups, such as butyl acrylate, for use with diallyl maleate, particularly since butyl acrylate is said to be preferred. This is illustrated further in the teachings of Aoyama et al. (U.S. 5,360,865).

Aoyama et al (U.S. 5,360,865) disclose the use of alkyl acrylates other than butyl acrylate in the cores of core shell impact modifiers and teach the significance of the alkyl group in determining glass transition temperature of alkyl acrylate homopolymers at column 2, lines 34-35. Aoyama et al. thereafter disclose the formation of cores having at least 40 wt % C₁-C₆ alkyl acrylate as the acrylate component of the core polymer. (See abstract, claims and Summary of the Invention). This would not lead one skilled in the art to use 100 wt % C₅-C₁₂ alkyl acrylates as the acrylate component of the core polymer.

Claims 69 ad 72

Claim 69 and new claim 72 define thermoplastic polymers with a core-shell impact modifier wherein the core is composed of a crosslinked polyorganosiloxane elastomer. In claim 69, the core does not require a covering. In claim 72, the core comprises a nucleus of crosslinked polyorganosiloxane and a covering composed of a copolymer (II) of n-alkyl acrylate and a grafting agent possessing allyl groups. Core-shell materials with these core compositions and configurations are not shown or suggested in the art.

In view of the above remarks, favorable reconsideration is courteously requested. Attached hereto is a marked-up version of the changes made to the claims by the current amendment. The attached page is captioned, "VERSION WITH MARKINGS TO SHOW CHANGES MADE". If there are any remaining issues which can be expedited by a telephone conference, the Examiner is courteously invited to telephone Counsel at the number indicated below.

Respectfully submitted,



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VERSION WITH MARKINGS TO SHOW THE CHANGES MADE

Please cancel claims 40 and 70 without prejudice or disclaimer

1. (Five times Amended) A polyvinyl chloride composition containing a core/shell/impact additive composed of a core based on alkyl acrylate or on a polyorganosiloxane rubber and a shell based on poly(alkyl methacrylate) or on a styrene-acrylonitrile copolymer, said impact additive comprising from:

a) 70 % to 90 % by weight of a crosslinked elastomeric core which is composed:

1) of 20 % to less than 100 % by weight of a nucleus composed of a copolymer (I) of an n-alkyl acrylate, the alkyl group having a carbon number ranging from 5 to 12, and of a polyfunctional crosslinking agent possessing unsaturated groups in its molecule, at least one of which is a vinyl group and optionally of a polyfunctional grafting agent possessing unsaturated groups in its molecule, at least one of which is an allyl group, and

2) of more than 0 and not more than 80 % by weight, of a covering composed of a copolymer (II) of n-alkyl acrylate, the alkyl group of which has a carbon number ranging from 4 to 12, and a grafting agent possessing allyl groups, the said covering containing a molar amount of grafting agent ranging from 0.05 % to 2.5 %, said grafting agent having only allyl functional groups, all having the same reactivity and,

b) 30 % to 10 % by weight of a shell grafted onto the said core composed of

a polymer of an alkyl methacrylate, the alkyl group of which has a carbon number ranging from 1 to 4, or alternatively of a statistical copolymer of an alkyl methacrylate, the alkyl group of which has a carbon number ranging from 1 to 4, and of an alkyl acrylate, the alkyl group of which has a carbon number ranging from 1 to 8, containing a molar amount of alkyl acrylate ranging from 5 % to 40 %, or alternatively composed of

a styrene-acrylonitrile copolymer.

28. (Five times Amended) A thermoplastic polymer composition containing a core/shell impact additive composed of a core based on alkyl acrylate or on a polyorganosiloxane rubber and a shell based on poly(alkyl methacrylate) or on a styrene-acrylonitrile copolymer, said impact additive comprising from:

a) 70 % to 90 % by weight of a crosslinked elastomeric core which is composed; :

1) of 20 % to less than 100 % by weight of a nucleus composed of a copolymer (I) of an n-alkyl acrylate, the alkyl group of which has a carbon number ranging from 5 to 12, and of a polyfunctional crosslinking agent possessing unsaturated groups in its molecule, at least one of which is of a vinyl group, and optionally of a polyfunctional grafting agent possessing unsaturated groups in its molecule, at least one of which is an allyl group, and

2) of an amount above 0%, but not more than 80 % by weight, of a covering composed of a copolymer (II) of n-alkyl acrylate, the alkyl group of which has a carbon number ranging from 4 to 12, and a grafting agent possessing allyl groups, the said covering containing a molar amount of grafting agent ranging from 0.05 % to 2.5 %, said grafting agent having only allyl functional groups, all having the same reactivity, and

b) 30 % to 10 % by weight of a shell grafted onto the said core composed of

a polymer of an alkyl methacrylate, the alkyl group of which has a carbon number ranging from 1 to 4, or alternatively of a statistical copolymer of an alkyl methacrylate, the alkyl group of which has a carbon number ranging from 1 to 4, and of an alkyl acrylate, the alkyl group of which has a carbon number ranging from 1 to 8, containing a molar amount of alkyl acrylate ranging from 5 % to 40 %, or alternatively composed of

a styrene-acrylonitrile copolymer.

69. (Twice Amended) A thermoplastic polymer composition containing a core-shell impact additive, such impact additive comprising:

(a) 70% to 90% by weight of a crosslinked elastomeric core composed of either a polyorganosiloxane or a copolymer of an n-alkyl acrylate, the n-alkyl group having from 5 to 12 carbon atoms, said elastomeric core further comprising:

a polyfunctional crosslinking agent possessing unsaturated groups in its molecules, at least one of which is a vinyl group, and
diallyl maleate as a grafting agent, and
(b) 30 % to 10 % by weight of a shell grafted onto the said core wherein said shell is composed of
a polymer of an alkyl methacrylate, the alkyl group of which has a carbon number ranging from 1 to 4, or alternatively of a statistical copolymer of an alkyl methacrylate, the alkyl group of which has a carbon number ranging from 1 to 4, and of an alkyl acrylate, the alkyl group of which has a carbon number ranging from 1 to 8, containing a molar amount of alkyl acrylate ranging from 5 % to 40 %, or alternatively composed of
a styrene-acrylonitrile copolymer.